

## Natural promoters for gene expression and metabolic monitoring in bacillus species

**Description of Technology:** Genes have been identified in the Bacillus genome that are responsive to various metabolic conditions and growth cycle changes. The new responsiveness of these genes allows for their use in regulated gene expression in Bacillus sp. and for the monitoring of bioreactor health.

### Patent Listing:

1. **US Patent No. 6,617,148**, Issued on September 9, 2003, “Natural promoters for gene expression and metabolic monitoring in bacillus species”

<http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HTO&f=1&u=%2Fnetacgi%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=TEXT&s1=6,617,148.PN.&OS=PN/6,617,148&RS=PN/6,617,148>

**Market Potential:** The Bacillus bacteria are useful production hosts for a variety of biological materials including enzymes, antibiotics and other pharmaceutically active products. The use of Bacillus species for production of biomaterials is particularly advantageous as compared with other microbial production hosts, particularly gram negative organisms. For example, the most common gram negative organism used in industrial microbiology, E. coli, suffers from the presence of endotoxins which, being pathogenic in man, are undesirable products. Additionally, gram negative hosts often produce proteins in inactive or insoluble forms which necessitate expensive reactivation and purification schemes. In contrast, Bacillus has a highly developed secretory system for the expression and transport of active proteins to the growth medium, thereby facilitating purification and eliminating costly reactivation procedures. Thus Bacillus is a production host of choice for many industrial applications. Methods to enhance gene expression or monitor culture health and biomass production for these organisms are desirable.

A significant advance in the art would be a process which would allow for analysis of the timing and extent of induction of most of the genes involved in production and provide inclusive information on the state of the biomass and cell response to growth conditions.

The problem to be solved therefore is to identify genes within the Bacillus genome that are regulated by metabolic conditions or growth cycle changes, and to apply these genes for gene expression and bioreactor monitoring in Bacillus sp. cultures. Applicants have solved the stated problem by using microarray technology to identify genes which are responsive to oxygen depletion, the presence of nitrite, or are sensitive to various stages of the stationary growth phase.

### Benefits:

- Apply special genes for gene expression and bioreactor monitoring in Bacillus sp. Cultures

### Applications:

- Monitoring of bioreactor health

### Contact:

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